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IN THE US PATENT AND TRADEMARK OFFICE

Application Number:	09/835,125
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Applicant:	Arne Sippens Groenewegen et al.
Application Title:	Database of Body Surface ECG P Wave Integral Maps for Localization of Left-side Atrial Arrhythmias
Examiner:	Not assigned
Art Unit:	2176

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, DC 20231, on Oct. 16, 2001 (date of deposit).

Name of Person Signing

Oct. 16, 2001
date

PRELIMINARY AMENDMENT

Commissioner of Patents and Trademarks
Washington, DC 20231

Sir:

Kindly amend the above application as follows:

SPECIFICATION:

Kindly replace the indicated paragraphs of the specification with the amended versions below. A marked-up version of the indicated paragraphs is attached on separate pages.

Page 9, lines 23-24:

Please delete the paragraph:

-FIG. 7 depicts a database of 17 different mean P wave integral maps generated by left atrial pacing according to an embodiment of the present invention.-

Page 20, lines 15-26:

Referring to **FIGS. 7A, 7B, 7C**, databases of 17 different mean P wave integral map patterns are generated by left atrial pacing according to an embodiment of the present invention. Higher or lower number for the groups with nearly identical P wave morphology can also be used. A higher number of groups improves the resolution of the database and thereby of the classification and localization of the left atrial arrhythmias. The encircled numbers **710A**, **710B**, and **710C** relate maps to a specific endocardial segment of pacing origin shown in the anatomical diagrams **720A, 720B** and **720C**. Endocardial segments of pacing can also be delineated as single points, clusters of points, or the like. Other anatomical or schematic diagrams of the left atrium can also be used. Representation of the endocardial segments of pacing may also include biplane fluoroscopic views. The mean P wave integral map display features extreme positions and zero line contour without positive and negative contour lines. Different forms of map format (e.g. 3-D or chest anatomy-based format) or map display (e.g. use of various color schemes)

REMARKS:

In response to the NOTICE OF INCOMPLETE REPLY mailed on October 5, 2001, the applicant made an amendment of the specification to cancel all references to the omitted drawing Fig. 7. No new matters are introduced into the application by the amendment. Therefore the incomplete reply is overcome.

Respectfully submitted,

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FIG. 1 depicts an overview of the development of a database of mean body surface ECG P wave data maps for classification and localization of left atrial arrhythmias according to an embodiment of the present invention.

FIG. 2 depicts a system for developing a database of mean body surface ECG P wave data maps for classification and localization of left atrial arrhythmias to better classify and localize left atrial arrhythmias in patients according to an embodiment of the present invention.

FIG. 3 depicts a method for separating obscured P waves from a superimposed QRST complex according to an embodiment of the present invention.

FIG. 4 depicts a method for selecting and processing good quality signals according to an embodiment of the present invention.

FIG. 5A depicts a sensor system having an array of sensing locations distributed across a subject's torso surface according to an embodiment of the present invention.

FIG. 5B depicts a body surface P wave integral map; a plot of a data matrix generated by mapping the integral values with positions corresponding to the location of the sensors across a subject's torso surface according to an embodiment of the present invention.

Fig. 5C depicts an ECG tracing illustrating a method for calculating an integral value across a selected time interval of a heart signal cycle from a single sensor location according to an embodiment of the present invention.

Fig. 6 depicts six mean body surface P wave integral maps obtained during pacing at the left upper or left lower pulmonary vein according to an embodiment of the present invention.

~~**FIG. 7** depicts a database of 17 different mean P wave integral maps generated by left atrial pacing according to an embodiment of the present invention.~~

spontaneously occurring or induced left atrial arrhythmias. In case of left atrial pacing, biplane fluoroscopy or other imaging modality is used, such as e.g. ultrasound, to determine the anatomical location of the pacing that was performed with a probe or catheter. In case of spontaneously occurring left atrial arrhythmias, similar imaging techniques can be used, while multipolar catheter electrogram recordings or alternative methods are used to determine the origin of the arrhythmias.

P wave body surface ECG integral maps of a given patient's left atrial arrhythmia **42** can subsequently be compared at step **44** to the reference database **38** to classify and localize the origin of that patient's left atrial arrhythmia. Consequently, a unique database is available for improved classification and localization of left atrial arrhythmias. The resolution of the database can always be updated and improved by adding new and/or more detailed information related to the P wave data and the underlying ectopic origin sites.

Referring to ~~**FIG. 7, an exemplary**~~ **FIGS. 7A, 7B, 7C,** databases of 17 different mean P wave integral map patterns ~~is shown~~ are generated by left atrial pacing according to an embodiment of the present invention. Higher or lower number for the groups with nearly identical P wave morphology can also be used. A higher number of groups improves the resolution of the database and thereby of the classification and localization of the left atrial arrhythmias. The encircled numbers ~~**710 (710A, 710B,** and **710C)**~~ relate maps to a specific endocardial segment of pacing origin shown in the anatomical diagrams ~~**720 (720A, 720B** and **720C)**~~. Endocardial segments of pacing can also be delineated as single points, clusters of points, or the like. Other anatomical or schematic diagrams of the left atrium can also be used. Representation of the endocardial segments of pacing may also include biplane fluoroscopic views. The mean P wave integral map display features extreme positions and zero line contour without positive and negative contour lines. Different forms of map format (e.g. 3-D or chest anatomy-based format) or map display (e.g. use of various color schemes)